CLAIMS

34. A biomedical biocompatible polyurethane based on (i) a diisocyanate linked polyester polymer component and (ii) a diol component, said diol component having a uniform block-length, the polymer being biodegradable.

35. The biomedical biocompatible polyurethane according to claim 34, having the formula:

$$\{A-B-C-B\}_n$$

wherein the term B denotes a diisocyanate moiety, the term A denotes a polyester moiety, the term C denotes a diol moiety and n is the number of recurring units.



36. A biomedical biocompatible polyurethane according to claim 34 consisting of repeating units of the following formula:

$$\{C(O)-NH-R_1-NH-C(O)-O-D-O-C(O)-NH-R_1-NH-C(O)-O-E-O\}_n,$$

wherein $R_1$ is an n-butylene moiety, D is a polyester moiety, E is selected from the group consisting of an ethylene glycol-based moiety, an n-butylene glycol-based moiety, an n-hexylene glycol-based moiety and a diethylene glycol-based moiety and n indicates the number of repeating units.

37. A biomedical biocompatible polyurethane according to claim 36, wherein E is selected from the group consisting of ethylene, n-butylene, n-hexylene, -CH2-CH2-O- CH2-CH2- and -XYX-, wherein X is selected from the group consisting of an ethylene glycol-based moiety, an n-butylene glycol-based moiety, an n-hexylene glycol-based moiety and a diethylene glycol-based moiety and Y is a 1,4 butane diisocyanate-based moiety resulting from the reaction of 1,4 butane diisocyanate with a diol selected from the group consisting of ethylene glycol, n-butylene glycol, n-hexylene glycol and diethylene glycol, with the mole ratio of glycol:diisocyanate being 2:1.

38. A biomedical biocompatible polyurethane according to claim 34, wherein the block-length is the same for at least 90% of the diol units.

39. A biomedical biocompatible polyurethane according to claim 34, wherein the polyester is based on a polyester prepared by ring opening polymerization.

40. A biomedical biocompatible polyurethane according to claim 39, wherein the polyester is a random copolyester and is a copolyester having at least two of a moiety selected from the group consisting of lactide, glycolide, trimethylene carbonate and ε-caprolactone.

41. A biomedical biocompatible polyurethane according to claim 34, wherein the polyester is based on (i) at least one carboxylic acid selected from the group consisting of lactic acid and succinic acid and (ii) at least one diol

selected from the group consisting of ethylene glycol, 1,4 butanediol, 1,6 hexanediol and diethylene glycol.

42. A biomedical biocompatible polyurethane according to claim 34 produced according to a process comprising the steps of (i) reacting the polyester with an isocyanate end-capped diol component in order to form a prepolymer, the ratio of isocyanate end-groups to polyester end-groups being at least 2:1, and then (ii) reacting the resulting prepolymer with water.

43. A biomedical biocompatible polyurethane according to claim 42, based on a copolyester of lactide and ε-caprolactone containing 5 to 95% of units of lactide and 5 to 95% of units of ε-caprolactone, based on number.

44. A reaction product having the formula -XYX- and having a uniform block-length produced according to the process comprising the step of reacting a diol selected from the group consisting of 1,6-hexane diol and diethyleneglycol with 1,4 butane diisocyanate wherein the mole ratio of diol:diisocyanate is 2:1 and wherein X is the diol-based component and Y is the 1,4 butane diisocyanate-based component.

45. A process for the preparation of a biomedical biocompatible polyurethane defined according to claim 34, comprising the steps of (i) reacting at least 2 moles of a diisocyanate with 1 mole of a polyester to form a first reaction product and (ii) reacting a diol selected from the

group consisting of 1,4 butanediol, 1,6 hexane diol and diethyleneglycol with said first reaction product.

46. A process for the preparation of a biomedical biocompatible polyurethane defined according to claim 34 comprising the steps of (i) reacting at least two moles of a diisocyanate with one mole of a diol selected from the group consisting of 1,4 butanediol, 1,6 hexane diol and diethyleneglycol to form a first reaction product and (ii) reacting a polyester which is a random copolymer with said first reaction product.

47. An implant constructed from at least one biomedical biocompatible polyurethane defined according to claim 34, having a porosity of 50 to 99 vol.%.

48. A method for reconstruction of at least one meniscal lesion comprising the step of effecting an adhesive implant to meniscal tissue having at least one of said lesions of a meniscus-reconstructing quantity at a meniscus-reconstructing rate of at least one polyurethane defined according to claim 34 for a fibrocartilage induction time of from 10 up to 30 weeks.

49. A biomedical biocompatible polyurethane having a phase separated morphology, comprising (i) soft segments selected from the group consisting of (a) polyester components, (b) polyether components and (c) polyester-polyether components and (ii) hard segments, said hard segments consisting of diol components having a uniform block-length, and wherein (A) the diol component and (B)at

least one of the polyester, the polyether or the polyester-polyether components have been linked to a diisocyanate component by means of reaction thereof with a diisocyanate.

50. A biomedical biocompatible polyurethane according to claim 38, wherein the block-length is the same for at least 98% of the diol units.

51. A biomedical biocompatible polyurethane according to claim 39, wherein the polyester is based on a random copolyester.

52. A biomedical biocompatible polyurethane according to claim 43, comprising from 40 up to 60% of units of lactide, based on number.

53. A biomedical biocompatible polyurethane according to claim 43, comprising from 40 up to 60% of units of ε-caprolactone, based on number.

54. A biomedical biocompatible polyurethane according to claim 49, wherein the diisocyanate is an aliphatic diisocyanate.

55. A biomedical biocompatible polyurethane according to claim 34 wherein the diisocyanate-linked polyester component is a 1,4 butane diisocyanate-linked polyester component.

56. A reaction product having a formula selected from the group consisting of YXY and YXYXY and having a uniform block length produced according to a process comprising the steps of reacting a diol selected from the group consisting of 1,4 butanediol, 1,6 hexanediol, diethylene glycol and ethylene glycol with 1,4 butane diisocyanate wherein X is the diol-based component and Y is the 1,4 butane diisocyanate-based component.

57. A biomedical biocompatible polyurethane according to claim 36, wherein E is an -YXY- or -YXYXY- reaction product component of diol (X) and 1,4 butane diisocyanate (Y).

58. A pre-polymer having the structure:

**OCN-E-NH-C(O)-D-C(O)-NH-E-NCO**

wherein D is a polyester component and E is selected from the group consisting of ethylene, n-butylene, n-hexylene, -CH2-CH2-O-CH2-CH2- and -XYX-, wherein X is selected from the group consisting of an ethylene glycol-based moiety, an n-butylene glycol-based moiety, an n-hexylene glycol-based moiety and a diethylene glycol-based moiety and Y is a 1,4 butane diisocyanate-based moiety resulting from the reaction of 1,4 butane diisocyanate with a diol selected from the group consisting of ethylene glycol, n-butylene glycol, n-hexylene glycol and diethylene glycol.

59. A process for preparing a urethane polymer comprising the steps of:

i. admixing equimolar quantities of L-lactide and ε-caprolactone in the presence of a stannous octoate

catalyst and a butanediol initiator thereby forming an L-lactide- ε-caprolactone prepolymer;

ii. admixing butanediol with a six-fold excess of butane diisocyanate thereby forming an isocyanate-terminated urethane block;

iii. dissolving the L-lactide- ε-caprolactone prepolymer in dimethyl sulfoxide to form a first solution;

iv. dissolving the isocyanate-terminated block in dimethyl sulfoxide to form a second solution;

v. admixing the first solution with the second solution to form a polyurethane reaction mass;

vi. recovering the resulting urethane polymer from the reaction mass.

60. A process for preparing a urethane polymer comprising the steps of:

i. admixing equimolar quantities of L-lactide and ε-caprolactone in the presence of a stannous octoate catalyst and a butanediol initiator thereby forming a L-lactide- ε-caprolactone prepolymer;

ii. admixing butane diisocyanate with a six-fold excess of butanediol thereby forming an hydroxyl-terminated urethane block;

iii. dissolving the L-lactide- ε-caprolactone prepolymer in dimethyl sulfoxide to form a first solution;

iv. dissolving the hydroxyl-terminated block in dimethyl sulfoxide to form a second solution;

v. admixing the first solution with the second solution to form a polyurethane reaction mass;

recovering the resulting urethane polymer from the reaction mass.

(plclaims/ks/109)